

## CLAIMS

- 1 1. A multi-axis interferometer comprising an optically transmissive monolith having a  
2 multiplexer portion and a beam splitter portion,
- 3 said multiplexer portion being configured to split an input beam into a  
4 corresponding plurality of intermediate beams, each of said intermediate  
5 beams being directed toward said beam splitter portion through a  
6 corresponding output port of said multiplexer portion;
- 7 said beam splitter portion being configured to separate said intermediate  
8 beam into a measurement component and a reference component.
- 9 2. The interferometer of claim 1, wherein said multiplexer portion comprises:  
10 a first interior face, and  
11 a second interior face opposite to said first interior face, said second interior  
12 face having disposed thereon an output port.
- 13 3. The interferometer of claim 2, wherein said output port comprises a beam steering  
14 element.
- 15 4. The interferometer of claim 3, wherein said beam steering element is configured to  
16 refract a beam incident from said first interior face into an intermediate beam normal  
17 to said second interior face.
- 18 5. The interferometer of claim 3, wherein said beam steering element comprises a  
19 diffraction grating.
- 20 6. The interferometer of claim 3, wherein said beam steering element comprises a  
21 volume of material having an index of refraction selected to refract said beam  
22 incident from said first interior face into said intermediate beam normal to said  
23 second interior face.
- 24 7. The interferometer of claim 2, wherein said plurality of partially transmissive  
25 refractors have transmissivities selected such that said each of said intermediate

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beams carries substantially the same power as any other intermediate beam.

27 8. The interferometer of claim 2, wherein said multiplexer further comprises a reflector  
28 disposed to redirect said input beam toward said second interior face at a grazing  
29 angle relative to said second interior face.

30 9. The interferometer of claim 2, wherein said reflector comprises an angled portion of  
31 said first face.

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32 10. The interferometer of claim 1, further comprising a corner reflector in optical  
33 communication with said output port and said beam splitter portion, said corner  
34 reflector being configured to direct said intermediate beam into said beam splitter  
35 portion.

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11. The interferometer of claim 1, wherein said beam splitter portion comprises a beam-  
splitting plane that transmits light having a first polarization and reflects light having  
a polarization other than said first polarization.

12. The interferometer of claim 1, further comprising a first polarization transformer in  
optical communication with a reference face of said beam splitter portion for  
intercepting said portion of said intermediate beam directed toward a reference  
reflector.

13. The interferometer of claim 12, further comprising a second polarization transformer  
in optical communication with a measurement face of said beam splitter portion for  
intercepting

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14. A multi-axis interferometer comprising:

an optically transparent monolith having a multiplexing layer that divides an  
input beam into a plurality of intermediate beams and a beam splitting  
layer that directs a measurement component of each of said intermediate  
beams along a measurement path, and a reference component of each of  
said intermediate beams along a reference path;

an output coupler in optical communication with said multiplexing layer and

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said beam splitting layer.

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15. The multi-axis interferometer of claim 14, wherein said multiplexing layer comprises

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a first reflector,

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a second reflector opposite said first reflector; and

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a beam steering facet oriented to direct said input beam toward said second

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reflector at a grazing angle.

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16. The multi-axis interferometer of claim 15, wherein said beam steering facet

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comprises an angled portion of said first reflector.

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17. The multi-axis interferometer of claim 14, wherein said output coupler comprises a

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partially transmissive medium disposed to intercept said input beam.

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18. The interferometer of claim 17, wherein said output coupler further comprises a beam

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steering element for altering a direction of said intermediate beam.

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19. The interferometer of claim 14, wherein said output coupler further comprises a

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reflector disposed to direct light from said multiplexing layer to said beam splitting

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layer.

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20. A multi-axis interferometer comprising:

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a beam multiplexer for forming a plurality of intermediate beams from an  
input beam;

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a beam splitter integral with said beam multiplexer for directing a

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measurement component of said intermediate beam along a measurement

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path having a first path length and a reference path having a second path

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length;

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an output coupler providing optical communication between said beam

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multiplexer and said beam splitter.